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Description

[0001] This invention relates to a panel.

[0002] Primarily, the invention relates to floor panels, more particularly decorative floor panels for forming a floor covering, however, it is not excluded to apply the invention with other forms of coverings, for example, as wall panels, ceiling panels and the like.

[0003] The invention relates in particular to panels comprising a substrate of a material on the basis of soft PVC (polyvinyl chloride), also called vinyl tiles or vinyl strips.

[0004] Panels of synthetic material are known, amongst others, from DE 20 2008 011589 U1, US 6591568 B1, WO 2007/141605 A2, WO 2009/061279 A1 and US 2002/0189183. In the latter document, reference is also made to the American patent application No. 09/152,684, which is granted under the No. US 6.306.318, and wherein for the material, the use of PVC is stated. The panels represented in the document US 2002/0189183 are formed in a mold. This technique shows the disadvantage that it is expensive and that the production rate is low. Further, the panels obtained in this manner are subjected to tolerance deviations as a result of the fact that expansions may occur when removing the panels from the mold, as a consequence of which the coupling means possibly formed at the edges, when installing the panels, either are difficult to fit into each other, or are sitting too loosely in each other.

[0005] A first aim of the invention consists in offering solutions for coupling such panels comprising a substrate of a material on the basis of soft PVC to each other in an adequate manner, such by means of appropriate coupling parts.

[0006] This aim is achieved by the invention which is defined by the appended claims.

[0007] Moreover, the disclosure in general also relates to a panel, in particular a floor panel, which, at least at two opposite edges, comprises coupling parts of the type allowing to couple two of such panels to each other by means of a downward movement of one panel in respect to the other, wherein these coupling parts form a first locking system, which effects a locking in the plane of the panels and perpendicularly to said edges, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels. A second aim of the invention consists in further optimizing panels of this type, such that the coupling parts offer new possibilities and, amongst others, also can be applied with panels comprising a substrate of a material on the basis of soft PVC.

[0008] The disclosure relates to a panel for forming a covering, more particularly a floor panel for forming a floor covering, which, at least at two opposite edges, comprises coupling parts of the type allowing to couple two of such panels to each other by means of a downward movement of one panel in respect to the other; wherein these coupling parts form a first locking system, which

effects a locking in the plane of the panels and perpendicularly to said edges, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels; wherein for example at least one of said coupling parts is realized at least partially in soft PVC, as well as at least partially in the form of a milled profiled part of this soft PVC. By milling the coupling parts at least partially from soft PVC, very precise tolerances can be maintained. In combination with the use of PVC then very controllable elastic properties may be imparted to the coupling parts, whereby on the whole good properties are obtained, in respect to a smooth coupling as well as in respect to the strength of the coupling which can be realized by means of such coupling parts.

[0009] The profiled parts, instead of by means of one or more milling treatments, can also be realized by one or more other mechanical cutting treatments.

[0010] In a preferred embodiment, the panel is realized at least with a substrate on the basis of soft PVC, and said coupling parts are integrally made of this substrate, preferably entirely by means of a mechanical cutting treatment, more particularly by means of a milling process.

[0011] The disclosure also relates to a panel for forming a covering, more particularly a floor panel for forming a floor covering, which, at least at two opposite edges, comprises coupling parts of the type allowing to couple two of such panels to each other by means of a downward movement of one panel in respect to the other; wherein these coupling parts form a first locking system, which effects a locking in the plane of the panels and perpendicularly to said edges, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels; wherein the first locking system is formed at least of an upwardly directed lower hook-shaped portion which is situated at one of said two edges, as well as of a downwardly directed upper hook-shaped portion which is situated at the opposite edge; and wherein the lower hook-shaped portion consists of a lip with an upwardly directed locking element, whereas the upper hook-shaped portion consists of a lip with a downwardly directed locking element; wherein for example at least one of said hook-shaped portions is bendable in respect to the plane of the respective panel, such that the pertaining locking element can perform a movement, more particularly a tilting movement, which facilitates coupling the panels.

[0012] These panels offer the advantage that they can be coupled smoothly at said edges, as the tilting movement provides for that the locking elements can engage more smoothly one behind the other, possibly without necessarily having to overcome a snap effect.

[0013] It is noted that, as will be explained further, the intended bending as such can take place in such hook-shaped portion itself, as well as at a distance therefrom, wherein the hook-shaped portion in the latter case then as a whole adopts a bent-out position.

[0014] According to a specific embodiment, the panel

is characterized in that the coupling means are configured such that the downwardly directed locking element is configured such that the downwardly directed locking element must be brought through an opening between the upwardly directed locking element and a locking part of the second locking system and that the downwardly directed locking element and said opening are configured such that the downwardly directed locking element fits more smoothly through said opening when at least one of said hook-shaped portions is bent, compared to the case when none of both hook-shaped portions is bent.

[0015] The disclosure also relates to a panel for forming a covering, more particularly a floor panel for forming a floor covering; wherein this panel comprises a substrate of a material on the basis of soft PVC; wherein this panel is rectangular, either oblong or square, and thus comprises a first pair of opposite edges and a second pair of opposite edges; wherein both pairs of opposite edges comprise coupling parts allowing to mutually couple a plurality of such panels to each other; wherein these coupling parts at both pairs of edges form a first locking system which effects a locking in the plane of the panels and perpendicular to the respective edges, as well as form a second locking system which effects a locking perpendicular to the plane of the panels; and wherein these coupling parts substantially are realized from said substrate; wherein for example the coupling parts at the first pair of opposite edges are configured such that two of such panels can be coupled to each other at these edges by means of a turning movement; and that the coupling parts at the second pair of opposite edges are configured such that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other, more particularly by means of the downward movement obtained as a result of the turning movement at the first pair of edges.

[0016] According to a preferred embodiment, this floor panel further is characterized in that the second locking system at the second pair of edges consists of locking parts engaging behind each other, which can be brought one behind the other by their elasticity and/or movability.

[0017] These Panels offer the advantage that, by also integrating the coupling parts at the second pair of sides into the substrate, ideal properties are obtained for realizing a coupling which allows a locking by means of a downward movement.

[0018] The disclosure also relates to a panel for forming a covering, more particularly a floor panel for forming a floor covering; which, at least at two opposite edges, comprises coupling parts of the type allowing to couple two of such panels to each other by means of a downward movement of one panel in respect to the other; wherein these coupling parts form a first locking system, which effects a locking in the plane of the panels and perpendicularly to said edges, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels; wherein the first locking system is formed at least of an upwardly directed lower hook-

shaped portion which is situated at one of said two edges, as well as of a downwardly directed upper hook-shaped portion which is situated at the opposite edge; wherein the lower hook-shaped portion consists of a lip with an upwardly directed locking element, whereas the upper hook-shaped portion consists of a lip with a downwardly directed locking element; and wherein for example the second locking system comprises locking parts which are situated next to the proximal end of the lower hook-shaped portion and the distal end of the upper hook-shaped portion, respectively; characterized in that at least one of said locking parts of the second locking system is made from soft PVC.

[0019] Herein, said locking parts preferably are made as a fixed and preferably compressible part.

[0020] More particularly, it is preferred herein that the panel substantially consists of a substrate on the basis of soft PVC and that said coupling parts are integrally realized in said substrate, wherein said locking parts are realized as fixed, possibly somewhat compressible parts.

[0021] By making use of soft PVC in a coupling system with coupling parts which can be joined together by a downward movement, it is obtained that the coupling parts can move smoothly along each other during coupling.

[0022] The panel according to the invention defined by the claims is a panel for forming a covering, more particularly a floor panel for forming a floor covering; wherein this panel is of the type which comprises a substrate of a material on the basis of soft PVC; wherein this panel, at least at two opposite edges, comprises coupling parts of the type allowing to couple two of such panels to each other by means of a downward movement of one panel in respect to the other; wherein these coupling parts form a first locking system, which effects a locking in the plane of the panels and perpendicularly to said edges, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels; wherein the first locking system is formed at least of an upwardly directed lower hook-shaped portion which is situated at one of said two edges, as well as of a downwardly directed upper hook-shaped portion which is situated at the opposite edge; wherein in said substrate, a reinforcement layer is present, which extends in the plane of the panel; that the lower hook-shaped portion consists of a lip with an upwardly directed locking element, whereas the upper hook-shaped portion consists of a lip with a downwardly directed locking element; and that both of said lips are configured such that, seen in cross-section, they are at least over a certain portion free from said reinforcement layer.

[0023] The term "reinforcement layer" is to be understood in a broad sense and also simply includes a layer which, for example, is applied as a basic carrier for building up the vinyl structure.

[0024] As both of the lips, over at least a portion thereof, are kept free from such reinforcement layer, the advantage is obtained that such reinforcement layer cannot

affect the bendability in these portions in a disadvantageous manner.

[0025] According to preferred embodiments, the panels also show one or more of the hereafter listed additional characteristics, inasmuch as these characteristics do not already form part of the basic characteristics. These characteristics consist in:

- that at least said coupling parts, which are of the type allowing that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other, are realized at least partially and preferably entirely of soft PVC;
- that it comprises a substrate of soft PVC and that at least said coupling parts, which are of the type allowing that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other, are integrally realized from the substrate;
- that said coupling parts, which are of the type allowing that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other, have a first locking system, which is formed at least of a downwardly directed first lower hook-shaped portion situated at one of the respective edges, as well as a downwardly directed upper hook-shaped portion situated at the opposite edge;
- that this panel is rectangular, either oblong or square, and thus comprises a first pair of opposite edges and a second pair of opposite edges, wherein both pairs of opposite edges comprise coupling parts allowing to mutually couple a plurality of such panels to each other, wherein these coupling parts at both pairs of edges form a first locking system which effects a locking in the plane of the panels and perpendicular to the respective edges, as well as form a second locking system which effects a locking perpendicularly to the plane of the panels, and wherein the coupling parts at one of both pairs of edges thus are formed by said coupling parts which are of the type allowing that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other;
- that the panel substantially consists of a substrate and that the coupling parts at both pairs of edges are realized substantially integrally from this substrate;
- that the substrate substantially consists of soft PVC, in which possibly a reinforcement layer is incorporated;
- that the substrate substantially consists of soft PVC, with the exception of possible top layers, backing layers and intermediate layers, which may consist of another material.

[0026] The panels of the invention are made in the form of rectangular oblong strips. The dimensions may vary greatly.

[0027] In respect to thickness, this preferably varies between 3 and 10 mm, and still better between 4 and 7 mm.

[0028] At the decor side, they comprise a decorative layer, which may carry any image. In a practical embodiment, the image represents a wood motif. More particularly, on each panel the appearance of a wooden plank is represented.

[0029] The disclosure provides a method for installing panels, more particularly floor panels, wherein these panels are rectangular, either oblong or square, and thus comprise a first pair of opposite edges and a second pair of opposite edges; wherein both pairs of opposite edges comprise coupling parts, which form a first locking system which effects a locking in the plane of the panels and perpendicular to the respective edges, as well as form a second locking system which effects a locking perpendicular to the plane of the panels; wherein the coupling parts at the first pairs of opposite edges are configured such that two of such floor panels can be coupled to each other at these edges by means of a turning movement; wherein the coupling parts at the second pair of opposite edges are configured such that two of such floor panels can be coupled to each other by means of a downward movement of one panel in respect to the other, more particularly by means of the downward movement which is obtained as a result of the turning movement at the first pair of edges; wherein at the second pair of edges, the locking system is formed at least of an upwardly directed lower hook-shaped portion situated at one of said two edges, as well as of a downwardly directed upper hook-shaped portion which is situated at the opposite edge; and wherein the lower hook-shaped portion consists of a lip with an upwardly directed locking element, whereas the upper hook-shaped portion consists of a lip with a downwardly directed locking element; with the characteristic that at the second pair of edges coupling parts are applied of which at least one of the lips, in respect to the plane of the panel concerned, can be bent out of this plane, such that the pertaining locking element can perform a movement, more particularly a tilting movement, which facilitates the coupling of the panels, and that the method provides at least the following steps:

- installing a first panel intended for forming part of a first row of panels;
- coupling a second panel to said first panel, such at said first pair of edges, wherein this second panel is intended for forming part of a second row successive to said first row of panels;
- coupling in the second row a third panel both to said second panel and to the first panel, wherein the third panel is coupled to the first panel by means of a turning movement, wherein the third panel, from an upwardly pivoted position, is brought into substantially the same plane as the first and second panels, whereas, as a result of this movement and the downward pressing-together movement created therein,

the hook-shaped portions engage into each other between the third and second panel;

- applying an underlay element therein;;
- and, during pressing together, as a result of the use of the underlay element, deforming, more particularly bending, at least one of said lips in such a manner that coupling, as aforementioned, is facilitated.

[0030] According to a variant, not specifically one or more lips are bent, but one or more of the hook-shaped portions are bent as a whole or locally, wherein the bending thus does not necessarily have to take place in the lips themselves.

[0031] This installation technique allows a smooth installation, without necessitating tools. Further advantages, as well as preferred techniques, will become clear from the detailed description.

[0032] It is clear that the method shows its advantages in particular when it is applied for installing panels in the form of strips or tiles on the basis of soft PVC, which are provided with said coupling parts.

[0033] According to a deviating variant of the method, the disclosure also relates to a method wherein the above-described, as well as below-described, technique in which an underlay element is applied and a bending is created, is applied for panels wherein at the first pair of edges the connection is performed in another manner than by means of a turning movement. The essence in fact consists in the particular technique of bending the coupling parts at one pair of edges, irrespective of the manner in which the other pair of edges is coupled.

[0034] It is noted that "soft PVC" is a term which expresses that this relates to supple PVC, in other words, PVC which is bendable in a relatively smooth manner. The term soft PVC is generally known in the art. Such soft PVC consists of PVC which is softened, preferably by means of a plasticizer added during the production process. Depending on the amount of plasticizer added, of course different degrees of suppleness can be obtained. Preferably, a suppleness will be applied which is such that, when a panel is gripped at one extremity, it hardly bends under its own weight and thus certainly will not limply hang downward, however, it will still be bendable by a manual force.

[0035] With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, some embodiments are described, with reference to the accompanying drawings, wherein:

Figure 1 in top plan view represents a panel, more particularly a floor panel;

Figures 2 and 3, at a larger scale, represent cross-sections according to the references II-II and III-III in figure 1;

Figures 4 and 5 represent how the panels can be interconnected at their long sides;

Figures 6 and 7 represent how the panels fit into

each other at their short sides;

Figure 8 represents how a plurality of panels from figure 1 can be connected to each other;

Figure 9, at a larger scale, represents the portion indicated by F9 in figure 8;

Figure 10 represents a particular technique for interconnecting panels;

Figure 11, at a larger scale, represents the portion indicated by F11 in figure 10;

Figures 12 and 13 further illustrate the aforementioned technique;

Figure 14 represents another particular embodiment of said technique;

Figure 15 in cross-section represents an embodiment of a panel according to the invention.

[0036] In figures 1 to 7, an embodiment of a panel 1 not in accordance with the claims but illustrative to the invention is represented, which is realized as a floor panel.

[0037] In the represented example, the panel 1 is made as an oblong rectangular strip and thus comprises a first pair of opposite edges 2-3, which in this case form the long sides of the panel 1, and a second pair of opposite edges 4-5, which form the short sides of the panel 1.

[0038] As is represented more in detail in figures 2 and 3, both pairs of opposite edges 2-3 and 4-5 comprise coupling parts 6-7, 8-9, respectively, which allow to mutually couple a plurality of such panels 1 to each other.

[0039] As specifically represented in the figures 4 and 5, coupling parts 6-7 at the first pair of opposite edges 2-3 are configured such that two of such panels can be coupled to each other at these edges 2-3 in a locking manner by means of a turning movement. Herein, the coupling parts 6-7 form a first locking system which effects a locking in the plane of the panels 1 and perpendicularly to said edges 2-3, thus, in this case in the horizontal direction, as well as form a second locking system, which effects a locking perpendicularly to the plane of the panels 1, in this case, thus, in the vertical direction. To this aim, the coupling parts 6-7 are constructed as a tongue 10 and a groove 11, which provide for the vertical locking and comprise locking parts 12-13, which, in the coupled condition, prevent the shifting apart of the tongue and groove.

[0040] Herein, it is preferred that, as indicated, the groove 11 is limited by a lower lip 14 and an upper lip 15, and that the locking parts 12 and 13 are performed in the form of cooperating projections, at the lower side of the tongue 10 and at the upper side of the lower lip 14, respectively. The cooperation is performed by means of locking surfaces 16 and 17 provided for this purpose. As also represented, it is also preferred that the lower lip 14 extends laterally up to beyond the distal end of the upper lip 15, more particularly such that the locking surface 17 is situated entirely in that portion of the lower lip 14 which is situated beyond the upper lip 15.

[0041] As schematically represented in figures 6 and

7, the coupling parts 8-9 at the second pair of opposite edges 4-5 are configured such that two of such panels 1 can be coupled to each other by means of a downward movement of one panel in respect to the other. This downward movement will be discussed more detailed below.

[0042] As is clearly visible in figure 7, the coupling parts 8-9 herein also form a first locking system, which effects a locking in the plane of the panels 1 and perpendicular to said edges 4-5, thus, in the case in the horizontal direction, as well as a second locking system, which effects a locking perpendicularly to the plane of the panels 1, in this case, thus, the vertical direction.

[0043] The first locking system is substantially formed of an upwardly directed lower hook-shaped portion 18 situated at the edge 5, as well as of a downwardly directed upper hook-shaped portion 19 which is situated at the opposite edge 4, which hook-shaped portions can be engaged one behind the other by said downward movement. The lower hook-shaped portion 18 consists of a lip 20, which extends laterally from the lower edge of the panel 1 and which is provided with an upwardly directed locking element 21 with a locking surface 22, whereas the upper hook-shaped portion 19 consists of a lip 23, which extends laterally from the upper edge of the panel 1 and which is provided with a downwardly directed locking element 24 with a locking surface 25.

[0044] The second locking system of the edges at the short sides is formed by locking parts 26-27, which are situated next to the proximal extremity 28 of the lower hook-shaped portion 18 and the distal extremity 29 of the upper hook-shaped portion 19, respectively. The locking parts 26-27 consist of projections engaging one behind the other, which define locking surfaces 30-31. It is noted that the coupling parts 8-9 principally also may be considered a tongue and groove coupling, wherein the locking part 27 functions as a tongue, whereas the groove in which this tongue gets seated, is defined by the locking part 26 functioning as the upper lip, and the first hook-shaped portion 18 functioning as the lower lip.

[0045] It is noted that the space between the vertically active locking part 26 and the horizontally active locking element 21, which is also indicated by opening H, functions as a female part 32, whereas the locking element 24 is made as a male part 33, which fits into the female part 32.

[0046] The panel 1 is substantially formed on the basis of soft polyvinyl chloride (PVC). More specifically, it comprises a substrate which is realized on the basis of soft PVC, which substrate is indicated by reference 34 in figures 2 through 13. In these figures, this substrate is schematically depicted as a single layer. In reality, this may be a single layer as well as several layers, which not all have to consist of PVC. Usually, a top layer 35 is provided on the substrate, which in figures 2 to 13 also is represented by a single layer, however, in reality also may consist of several layers, which further will become clear from the description of figure 14. The top layer 35 has at

least the aim of providing a decorative upper side 36 at the panel 1, preferably in the form of a printed decor and, at least in the case of a floor panel, providing for offering a wear-resistant surface.

[0047] As indicated in figure 7, the panels have a total thickness T. The thickness T preferably has a value situated between 3 and 10 mm. In particular in a practical embodiment, this value will be situated between 4 and 7 mm.

[0048] It is noted that the aforementioned coupling parts, 6-7 as well as 8-9, as represented, preferably are formed integrally from the material of the actual panel 1, more particularly from the substrate material. As a result thereof, the coupling parts as such also consist of soft PVC. It is noted that the coupling parts 6-7 and 8-9 preferably are also formed by means of a mechanical treatment, more particularly milling treatments. Milling techniques which allow to provide coupling parts at the edges of the panels are known, amongst others, from WO 97/47834. By selecting appropriate cutters and by means of an appropriate adjustment thereof, thus, appropriate profiled parts, for example, as are represented in the figures, may be realized.

[0049] Preferably, the whole is designed such that, by exerting a relatively low force, preferably manually, at least one of said hook-shaped portions 18-19 can be bent out of the plane of the panel 1, and preferably even both can be bent out of the plane of the panel 1. By this bendability, it is meant that such hook-shaped portion can adopt a bent position in respect to the remainder of such panel 1, wherein this thus may relate to a bending in such hook-shaped portion itself, for example, in the lip thereof, as well as to a bending in the panel itself, proximally from the hook-shaped portion, such that the hook-shaped portion is put at an angle in respect to the panel itself, or to a combination of both. This bendability is achieved, amongst others, due to the suppleness of said soft PVC.

[0050] More particularly, it is preferred that at least one of said hook-shaped portions 18-19, in respect to the plane of the panel concerned, can be bent out of this plane, such that the pertaining locking element 21-24 can perform a movement, more particularly a tilting movement, which facilitates coupling the panels. Such bending allows a smooth coupling of such panels by means of an underlay element 37, according to an installation technique which will be explained further in particular.

[0051] In figures 8 and 9, it is schematically represented how the panels 1 can be installed. In order to explain the method, a number of the panels 1, in order to differentiate additionally, are indicated by references 1A, 1B, 1C. The panels 1 are laid down row per row and coupled to each other. In order to obtain that the panels are coupled at the edges 2-3 as well as 4-5, the method comprises at least the following steps:

- installing a first panel 1A intended for forming part of a first row of panels;
- coupling a second panel 1B to said first panel 1A,

such at first edges 2-3, wherein this second panel 1B is intended for forming part of a second row successive to said first row of panels;

- coupling in the second row a third panel 1C both to said second panel 1B as to the first panel 1A, wherein the third panel 1C is coupled to the first panel 1A by means of a turning movement, wherein the third panel 1C, from an upwardly pivoted position, is brought into substantially the same plane as the first and second panels, whereas, as a result of this movement and the downward movement created therein, the hook-shaped portions 18-19 engage into each other between the third and second panel.

[0052] It is clear that normally, between installing the first panel 1A and coupling the second panel 1B thereto, first also all further panels of the row in which the first panel 1A is situated, are installed. Coupling the second panel 1B to the first panel 1A, of course, also is performed by connecting the panel 1B at its edge 2, by means of a turning movement as represented in figure 4, to the edge 3 of the first panel 1A and possible other panels of the row of the panel 1A.

[0053] When connecting the panel 1C to the panel 1A, also a turning movement, as in figure 4, is applied. Herein, a downward movement M is performed at the short edges 4-5, by which the coupling parts 8 and 9 are engaged into each other.

[0054] By this downward movement M, in a very broad sense each form of movement is meant in which, in a cross-section as seen in figures 6 and 7, the one panel is let down from a higher position in relation to the other. This movement M does not necessarily have to be a rectilinear movement, and during this movement, temporary deformations in the panels and more particularly in the hook-shaped portions 18 and 19 may occur.

[0055] Theoretically, a downward movement M, which, seen in cross-section, is rectilinear or almost rectilinear, may be used for engaging a panel 1C into a panel 1B, which means that the right-hand panel in figure 6, seen in cross-section, simply is pressed straight down into the position of figure 7. It is clear that herein effectively small local deformations will occur, as the locking parts 26 and 27 have to be pressed home one behind each other by means of a snap effect. Herein, the snap effect is obtained by the elasticity of the soft PVC and the bending actions in the component parts and compressions in the material occurring as a result thereof.

[0056] Practically seen, however, use shall be made of a technique described in more detail below, by which the installation of the panels 1 is facilitated. Namely, it is so that, when joining the panels by means of the aforementioned theoretical manner, the hook-shaped portions 18-19 are difficult to press fixedly into each other as the suppleness of soft PVC is too low. Pressing the hook-shaped portions 18-19 fixedly together according to said theoretical manner, in the represented profile normally will be realized only by exerting a force with a tool onto

the upper side of the panel to be joined into the other, on the respective edge thereof, for example, by means of a hammer or the like.

[0057] According to a practical technique of the disclosure, an underlay element 37 is applied when interconnecting the panels 1C and 1B, in such a manner that during joining a bending is created in one or both of the hook-shaped portions 18-19, as a result of which the male part 33 more smoothly fits into the female part 32. Herein, the underlay element 37 is provided underneath the edge 5 of the panel 1B, more particularly is pushed there under, such that the hook-shaped portion 18 is pending freely at a distance above the subsurface, more particularly such as can be seen in figures 12 and 13. By subsequently coupling the panel 1C during turning down to the panel 1B, different movement mechanisms can be created, depending on the location where a pressure is exerted on the panel 1C, which mechanisms, however, always lead to a smooth joining of the edges, without having to exert an extreme force for this purpose. Thus, the pressing-on may take place simply by exerting a force F on the panel 1C with a finger.

[0058] According to figure 12, the force F is exerted on top of the hook-shaped portion 19, with the result that this hook-shaped portion 19 as such bends not or a little and only the hook-shaped portion 18 bends downward, whereby the opening H indicated in figure 11 enlarges a little and the male part 33 will fit better into the female part 32.

[0059] However, still better, as represented in figure 13, a force F is exerted on the panel 1C at a distance which is somewhat remote from the edge 4, with the result that the entire hook-shaped portion 19 comes into an upwardly bent position in respect to the remainder of the panel. As a result thereof, the locking element 24 performs a tilting movement, by which it fits more smoothly through said opening H, after which, after removing the pressure on the panel 1C, this locking portion 24 tilts back into its normal position, wherein the locking part 27 comes to sit underneath the locking part 26. It is clear that herein normally also a bending in the hook-shaped portion 18 will occur, as a result of which, analogous as discussed by means of figure 12, also the joining is facilitated once more.

[0060] During joining according to figure 13, a snap effect may or may not occur, depending on the design of the coupling parts and the bending effects of the hook-shaped portions 18 and 19 realized during joining. It is clear that by a bending herein a bending in a hook-shaped portion 18 or 19 itself has to be understood, thus, that the lip 20 and/or 23 itself is bent, as well as a bending of such part in its totality, wherein the bending zone is not located in the lip 20 and/or 23, but at a farther distance from the respective edge in the respective panel itself. The bending may also consist of the combination of these two possibilities.

[0061] In the most preferred embodiment, the coupling parts 8-9 are realized such that, by realizing a bending

as in figure 13, however, in a more pronounced form, the male part 33 can be inserted in the female part 32 without any snap effect, this by means of the above-discussed tilting movement. By means of a pronounced bending, the male part 33 effectively can be inserted freely into the opening H, after which this, by the tilting back thereof, it is seated with the locking part 27 underneath the locking part 26 without any snap effect. Such pronounced bending is represented in figure 14, wherein said opening is enlarged such that the locking element 24 can move smoothly downward between the locking element 21 and the locking part 26, whether or not with any clamping effect, until the locking surface 31 slides underneath the locking surface 30 and the locking is obtained. It is noted that the technique applied herein results in that the coupling is no longer operative as a so-called "push-lock" coupling, but rather provides for a local turning movement, wherein certain portions thus perform tilting movements into each other by the deformation of the respective edge zones.

[0062] An important advantage of the herein-above discussed practical methods consists in that for moving the locking parts 26 and 27 one behind each other, the panel 1C, when being let down, does not have to perform a short to-and-fro shifting movement along the already coupled edge 2, or this shifting movement is strongly minimized. In a number of known so-called "angle-push" or "fold-down" systems, such to-and-fro shifting movement in fact forms a problem, as the new panel, which is already coupled at the longitudinal edges, often does not properly pull itself against the preceding panel in the same row. By the above-described technique, wherein a tilting movement occurs in the edges 4-5 to be coupled, the entire panel, in order to provide the locking parts 26 and 27 one behind the other, does not have to perform a to-and-fro displacement in the longitudinal direction, or this to-and-fro displacement is considerably reduced, by which said problem is excluded, minimized, respectively.

[0063] Finally, in figure 15 a particular embodiment of a panel according to the invention is represented, with the particularity that in the substrate 34 a reinforcement layer 38 is provided, preferably of glass fiber, more particularly a net or fleece of glass fiber. An important preferred characteristic herein is that both of the lips 20, 23, comprise a portion G1, G2, respectively, which are free from the reinforcement layer 38, such that a good bendability in the respective lip is maintained.

[0064] As an example, figure 15, apart from the reinforcement layer 38, also represents a practical construction, which is composed as follows:

- the substrate, which consists of two basic layers 39-40, with the reinforcement layer 38 embedded there between;
- the top layer 35, which is composed of a film 41 printed with a motif, a transparent wear layer 42 and one or more transparent lacquer layers 43;
- at the underside, a backing layer 44.

[0065] The basic layers 39 and 40 consist of PVC, possibly recycled PVC, whereas the reinforcement layer 38 consists of a glass fiber net. The printed film 41 consists of a printed PVC film. The transparent wear layer 42 consists of a thin layer of vinyl, in which wear-resistant particles, preferably ceramic particles, such as corundum and the like, are incorporated. The lacquer layers 43 offer an additional protection and preferably are formed of two layers of transparent polyurethane lacquer, in which optionally also wear-resistant particles have been incorporated.

[0066] The thicknesses of the layers may differ from manufacturer to manufacturer. In figure 15, they are depicted only schematically. In a practical embodiment, these may have, for example, the following thicknesses: 1 mm for the backing layer 44; 2.5 mm for the lower basic layer 37; 0.3 mm for the glass fiber net; 1.5 mm for the upper basic layer 38; 0.1 mm for the printed film 39; 0.5 mm for the wear layer 40; and 0.1 mm for the whole of lacquer layers 41.

[0067] Further, impressions can be provided in the surface, in the form of a relief, which, for example, imitates a real surface structure, for example, of wood or the like. This relief can be performed in register with the decor.

[0068] Further, it is noted in general that preferably also one or more of the following characteristics are applied:

- the locking part 27 is placed somewhat towards the inside, such that it is situated entirely underneath the upper side of its own panel;
- the locking parts 26-27 forming the second locking system are made in the form of projections, undercuts, respectively.

[0069] The present invention is in no way restricted to the embodiments described by way of example and represented in the figures, however, such panel can be realized according to various variants, without leaving the scope of the invention defined by the appended claims.

[0070] For example, a support portion 45 can be provided at the underlay element 37, with which this underlay element 37 can be slid against the front edge of the panel 1B, in order to obtain that the underlay element is situated perpendicularly to the longitudinal direction of the panels. At the front edge 46 possibly a means, such as an inclined part, can be provided, as a result of which the underlay element can be slid smoothly under the already installed panel 1B. It is noted that the underlay element 37 preferably has such a length that it reaches up to underneath the panel 1A.

[0071] Finally, it is noted that the panels above substantially are described as floor panels. A certain terminology refers to the position taken by a panel when applied as flooring. However, it is clear that with an application in wall or ceiling panels, this terminology has to be interpreted in an adapted manner. A lower hook-shaped portion then has to be seen as a hook-shaped portion situated against the rear side. An upwardly di-

rected locking element then has to be seen as a locking element extending in the direction from the rear side to the decorative side. A downward movement then forms the movement by which one panel is moved with its rear side towards the plane in which the covering has to be realized.

Claims

1. Panel for forming a covering, more particularly a floor panel for forming a floor covering; wherein this panel (1) comprises a substrate (34) of a material on the basis of soft PVC; wherein this panel (1) is rectangular, either oblong or square, and thus comprises a first pair of opposite edges (2-3) and a second pair of opposite edges (4-5); wherein both pairs of opposite edges (2-3, 4-5) comprise coupling parts (6-7, 8-9) allowing to mutually couple a plurality of such panels (1) to each other; wherein these coupling parts (6-7, 8-9) at both pairs of edges (2-3, 4-5) form a first locking system which effects a locking in the plane of the panels and perpendicular to the respective edges, as well as form a second locking system which effects a locking perpendicular to the plane of the panels; and wherein these coupling parts (6-7, 8-9) substantially are realized from said substrate; wherein the coupling parts at the first pair of opposite edges (2-3) are configured such that two of such panels (1) can be coupled to each other at these edges by means of a turning movement; and that the coupling parts (8-9) at the second pair of opposite edges (4-5) are configured such that two of such floor panels (1) can be coupled to each other by means of a downward movement of one panel in respect to the other, more particularly by means of the downward movement obtained as a result of the turning movement at the first pair of edges;

wherein the first locking system at the second pair of opposite edges (4-5) is formed at least of an upwardly directed lower hook-shaped portion (18) which is situated at one of said two edges (5), as well as of a downwardly directed upper hook-shaped portion (19) which is situated at the opposite edge (4);

wherein the lower hook-shaped portion (18) consists of a lip (20) with an upwardly directed locking element (21), whereas the upper hook-shaped portion (19) consists of a lip (23) with a downwardly directed locking element (24);

wherein in said substrate (34), a reinforcement layer (38) is present, which extends in the plane of the panel (1);

characterized in that both of said lips (20-23) are configured such that, seen in cross-section, they are at least over a certain portion (G1-G2) free from said reinforcement layer (38) so that

the reinforcement layer cannot affect the bendability in these portions in a disadvantageous manner.

2. Panel according to claim 1, wherein at least one of the hook-shaped portions is bendable in respect to the plane of the respective panel, such that the pertaining locking element can perform a movement, more particularly a tilting movement, which facilitates coupling the panels.
3. Panel according to claim 1 or 2, wherein the second locking system at the second pair of opposite edges (4-5) comprises locking parts (26, 27) which are situated next to the proximal end of the lower hook-shaped portion (18) and the distal end of the upper hook-shaped portion (19), respectively; wherein at least one of said locking parts (26, 27) of the second locking system is made from soft PVC.
4. Panel according to any of the preceding claims, **characterized in that** at least said coupling parts (8-9), which are of the type allowing to couple two of such panels (1) to each other by means of a downward movement of one panel in respect to the other, are realized entirely in soft PVC.
5. Panel according to any of the preceding claims, wherein the thickness of the panel (1) is between 3 and 10 mm and still better between 4 and 7 mm.

Patentansprüche

1. Paneel zum Bilden eines Belags, insbesondere ein Bodenpaneel zum Bilden eines Bodenbelags; wobei dieses Paneel (1) ein Substrat (34) aus einem Material auf der Basis von Weich-PVC umfasst; wobei dieses Paneel (1) rechteckig, entweder länglich oder quadratisch, ist und somit ein erstes Paar gegenüberliegender Kanten (2-3) und ein zweites Paar gegenüberliegender Kanten (4-5) umfasst; wobei beide Paare gegenüberliegender Kanten (2-3, 4-5) Verbindungsteile (6-7, 7-8) umfassen, die eine wechselseitige Verbindung einer Vielzahl solcher Paneele (1) miteinander erlauben; wobei diese Verbindungsteile (6-7, 8-9) an beiden Paaren von Kanten (2-3, 4-5) ein erstes Verriegelungssystem bilden, das eine Verriegelung in der Ebene der Paneele und senkrecht zu den jeweiligen Kanten bewirkt, wie auch ein zweites Verriegelungssystem bilden, das eine Verriegelung senkrecht zur Ebene der Paneele bewirkt; und wobei diese Verbindungsteile (6-7, 8-9) im Wesentlichen aus dem Substrat ausgeführt sind; wobei die Verbindungsteile am ersten Paar gegenüberliegender Kanten (2-3) so gestaltet sind, dass zwei solcher Paneele (1) an diesen Kanten durch eine Drehbewegung miteinander verbunden werden können;

und dass die Verbindungsteile (8-9) am zweiten Paar gegenüberliegender Kanten (4-5) so gestaltet sind, dass zwei solcher Bodenpaneele (1) durch eine Abwärtsbewegung eines Paneels in Bezug auf das andere miteinander verbunden werden können, insbesondere durch die Abwärtsbewegung, die infolge der Drehbewegung am ersten Paar von Kanten erhalten wird;

wobei das erste Verriegelungssystem am zweiten Paar gegenüberliegender Kanten (4-5) mindestens aus einem nach oben gerichteten unteren hakenförmigen Abschnitt (18) gebildet ist, der an einer der zwei Kanten (5) gelegen ist, wie auch aus einem nach unten gerichteten oberen hakenförmigen Abschnitt (19), der an der gegenüberliegenden Kante (4) gelegen ist; wobei der untere hakenförmige Abschnitt (18) aus einer Lippe (20) mit einem nach oben gerichteten Verriegelungselement (21) besteht, während der obere hakenförmige Abschnitt (19) aus einer Lippe (23) mit einem nach unten gerichteten Verriegelungselement (24) besteht; wobei im Substrat (34) eine Verstärkungsschicht (38) vorhanden ist, die sich in der Ebene des Paneels (1) erstreckt;

dadurch gekennzeichnet, dass die beiden Lippen (20-23) so gestaltet sind, dass sie bei Betrachtung im Querschnitt mindestens über einem gewissen Abschnitt (G1-G2) frei von der Verstärkungsschicht (38) sind, sodass die Verstärkungsschicht die Biegebarkeit in diesen Abschnitten nicht beeinträchtigen kann in nachteiliger Weise.

2. Paneel nach Anspruch 1, wobei mindestens einer der hakenförmigen Abschnitte in Bezug auf die Ebene des jeweiligen Paneels biegebar ist, sodass das zugehörige Verriegelungselement eine Bewegung, insbesondere eine Kippbewegung, durchführen kann, die die Verbindung der Paneele erleichtert.
3. Paneel nach Anspruch 1 oder 2, wobei das zweite Verriegelungssystem am zweiten Paar gegenüberliegender Kanten (4-5) Verriegelungsteile (26, 27) umfasst, die neben dem proximalen Ende des unteren hakenförmigen Abschnitts (18) beziehungsweise dem distalen Ende des oberen hakenförmigen Abschnitts (19) gelegen sind; wobei mindestens einer der Verriegelungsteile (26, 27) des zweiten Verriegelungssystems aus Weich-PVC gefertigt ist.
4. Paneel nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens die Verbindungsteile (8-9), die von der Art sind, die erlaubt, zwei solcher Paneele (1) durch eine Abwärtsbewegung eines Paneels in Bezug auf das andere miteinander zu verbinden, vollständig in Weich-PVC

ausgeführt sind.

5. Paneel nach einem der vorstehenden Ansprüche, wobei die Dicke des Paneels (1) zwischen 3 und 10 mm und noch besser zwischen 4 und 7 mm beträgt.

Revendications

1. Panneau pour la formation d'un revêtement, plus particulièrement panneau de sol pour la formation d'un revêtement de sol ; dans lequel ce panneau (1) comprend un substrat (34) constitué d'une matière à base de PVC souple ; dans lequel ce panneau (1) est rectangulaire, soit oblong, soit carré, et comprend par conséquent une première paire de bords opposés (2-3) et une seconde paire de bords opposés (4-5) ; dans lequel les deux paires de bords opposés (2-3, 4-5) comprennent des éléments d'accouplement (6-7, 8-9) permettant d'accoupler réciproquement un certain nombre de panneaux (1) de ce type les uns aux autres ; dans lequel ces éléments d'accouplement (6-7, 8-9) aux deux paires de bords (2-3, 4-5) forment un premier système de verrouillage qui met en oeuvre un verrouillage dans le plan des panneaux et perpendiculairement aux bords respectifs, et forment également un second système de verrouillage qui met en oeuvre un verrouillage perpendiculairement par rapport au plan des panneaux; et dans lequel ces éléments d'accouplement (6-7, 8-9) sont réalisés à titre substantiel à partir dudit substrat ; dans lequel les éléments d'accouplement à la première paire de bords opposés (2-3) sont configurés d'une manière telle que deux des panneaux (1) de ce type peuvent être accouplés l'un à l'autre à ces bords au moyen d'un mouvement de rotation et telle que les éléments d'accouplement (8-9) à la seconde paire de bords opposés (4-5) sont configurés d'une manière telle que deux des panneaux (1) de ce type peuvent être accouplés l'un à l'autre au moyen d'un mouvement orienté vers le bas le d'un panneau par rapport à l'autre, plus particulièrement au moyen du mouvement orienté vers le bas que l'on obtient suite au mouvement de rotation à la première paire de bords ;

dans lequel le premier système de verrouillage à la seconde paire de bords opposés (4-5) est constitué au moins par une portion inférieure (18) dirigée vers le haut en forme de crochet qui est située à un desdits deux bords (5), ainsi que par une portion supérieure (19) dirigée vers le bas en forme de crochet qui est située au bord opposé (4) ;

dans lequel la portion inférieure en forme de crochet (18) est constituée par une lèvre (20) qui comprend un élément de verrouillage (21) dirigé vers le haut, tandis que la portion supérieure en

- forme de crochet (19) est constituée par une lèvre (23) qui comprend un élément de verrouillage (24) dirigé vers le bas ; dans lequel, dans ledit substrat (34), on prévoit une couche de renforcement (34) qui s'étend dans le plan du panneau (1) ;
- caractérisé en ce que** lesdites deux lèvres (20-23) sont configurées d'une manière telle que, lorsqu'on regarde dans une vue en coupe transversale, sont, au moins sur une certaine portion (G1-G2) exemptes de ladite couche de renforcement (38), d'une manière telle que la couche de renforcement ne peut pas affecter l'aptitude au pliage dans ces portions d'une manière désavantageuse.
- 5
- 10
- 15
2. Panneau selon la revendication 1, dans lequel au moins une des portions en forme de crochet est pliable par rapport au plan du panneau respectif, d'une manière telle que l'élément de verrouillage correspondant peut effectuer un mouvement, plus particulièrement un mouvement de basculement, qui facilite l'accouplement des panneaux.
- 20
3. Panneau selon la revendication 1 ou 2, dans lequel le second système de verrouillage à la seconde paire de bords opposés (4-5) comprend des éléments de verrouillage (26, 27) qui sont situés à proximité de l'extrémité proximale de la portion inférieure en forme de crochet (18) et de l'extrémité distale de la portion supérieure en forme de crochet (19), respectivement ; dans lequel au moins un desdits éléments de verrouillage (26, 27) du second système de verrouillage est réalisé à partir de PVC souple.
- 25
- 30
- 35
4. Panneau selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**au moins lesdits éléments d'accouplement (8-9) qui sont du type permettant l'accouplement de deux panneaux de ce type (1) l'un à l'autre au moyen d'un mouvement orienté vers le bas d'un panneau par rapport à l'autre, sont réalisés entièrement en PVC souple.
- 40
5. Panneau selon l'une quelconque des revendications précédentes, dans lequel l'épaisseur du panneau (1) se situe entre 3 et 10 mm et encore mieux entre 4 et 7 mm.
- 45
- 50
- 55

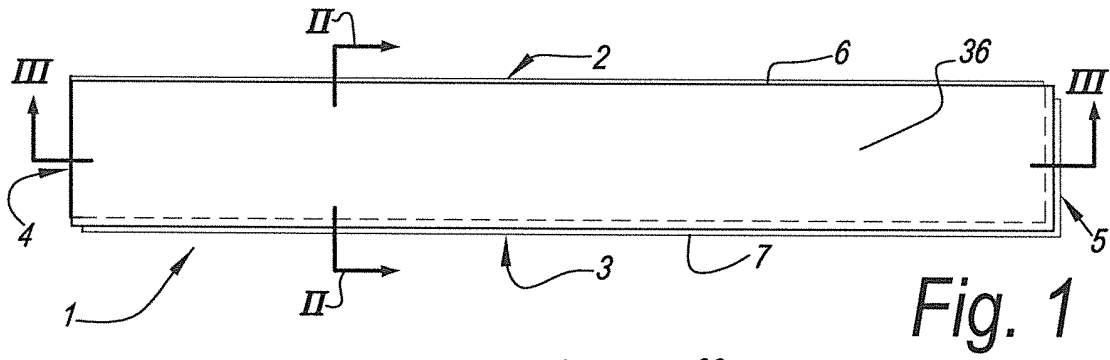


Fig. 1

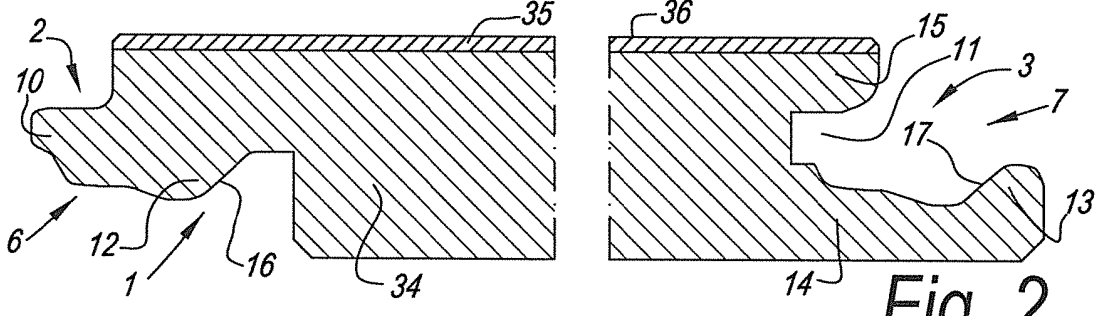


Fig. 2

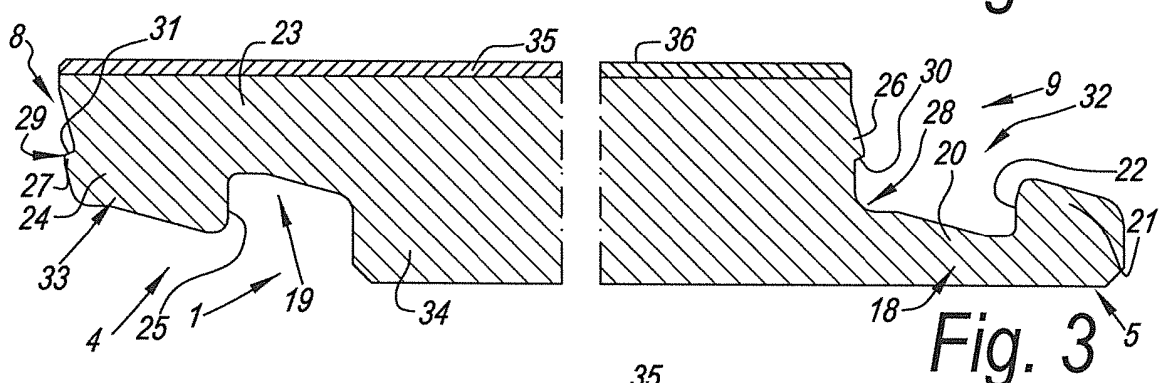


Fig. 3

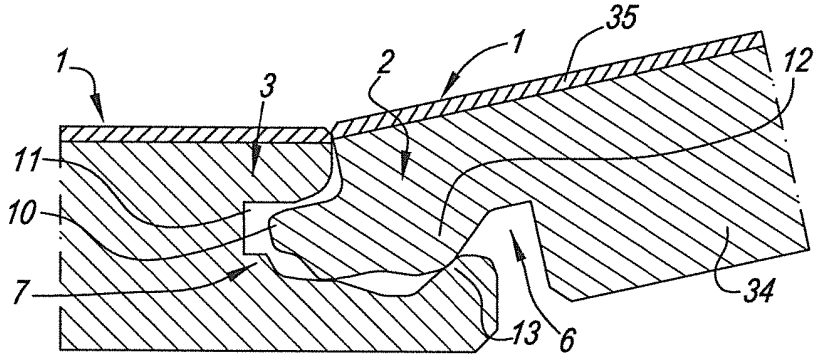


Fig. 4

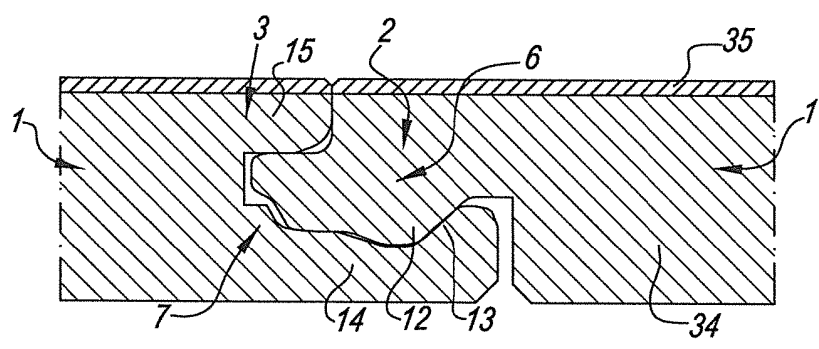


Fig. 5

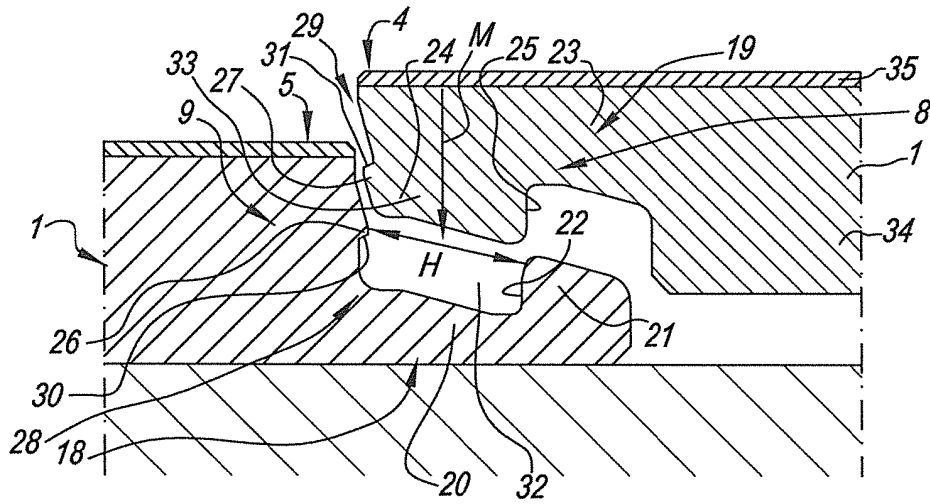


Fig. 6

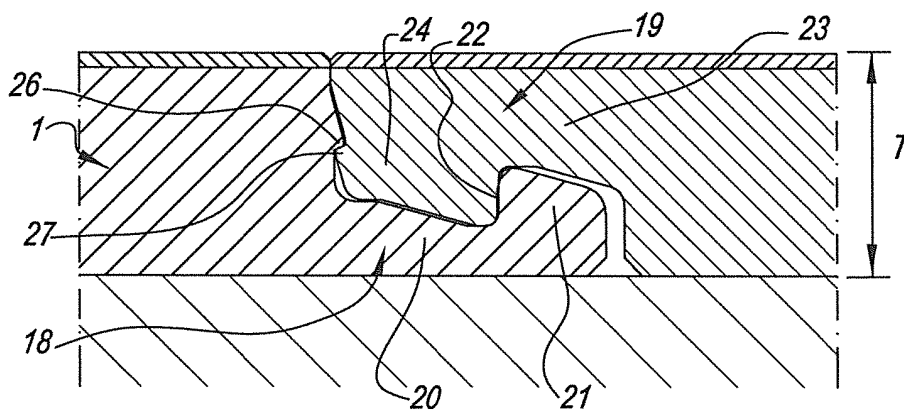


Fig. 7

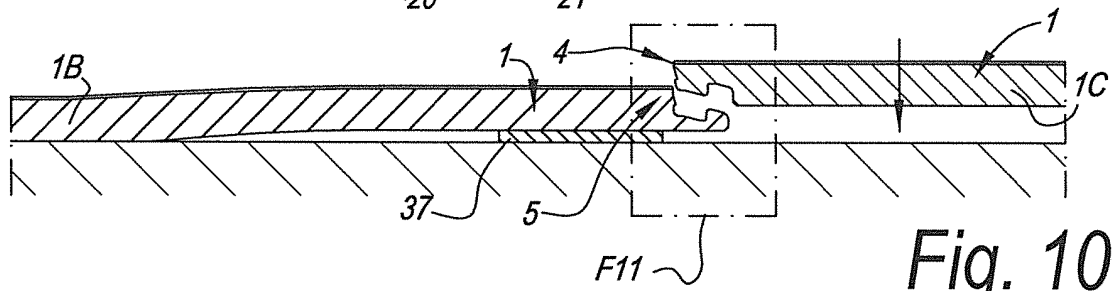


Fig. 10

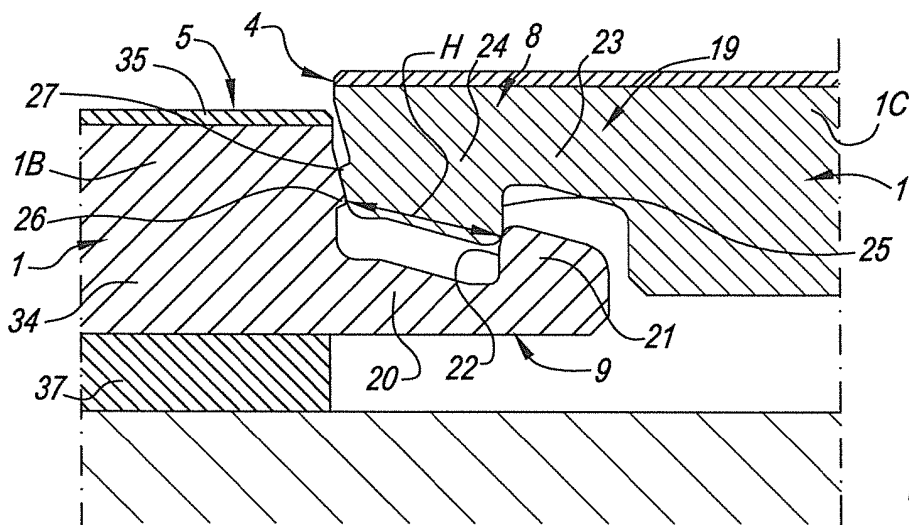


Fig. 11

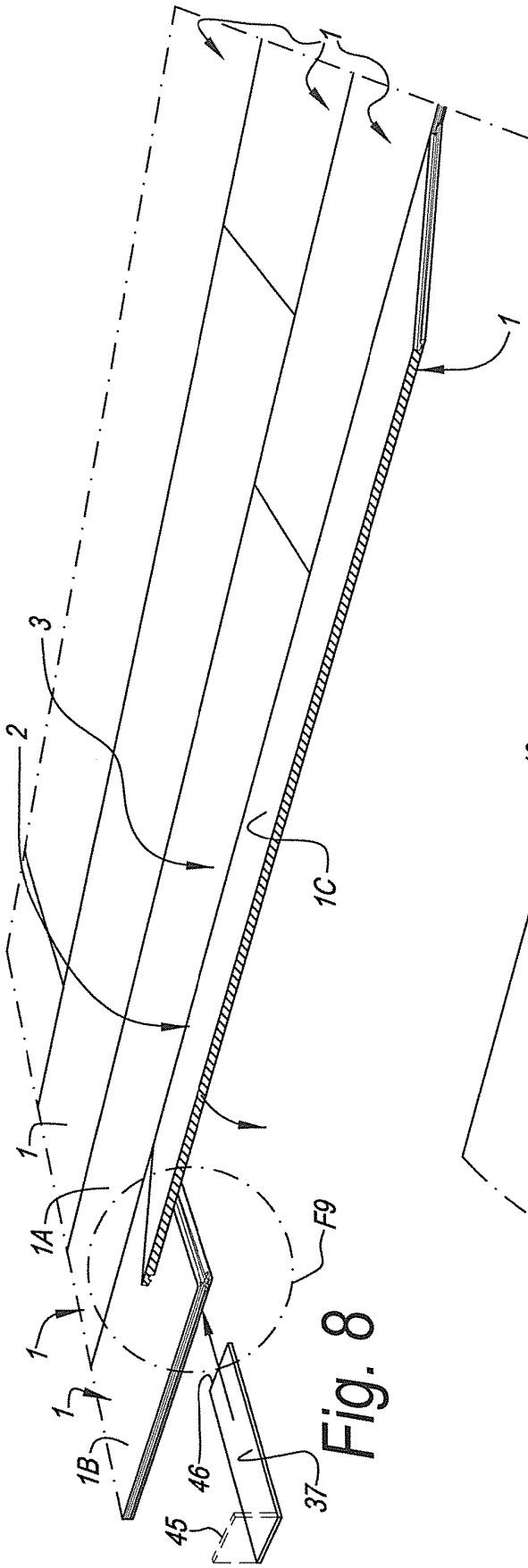


Fig. 8

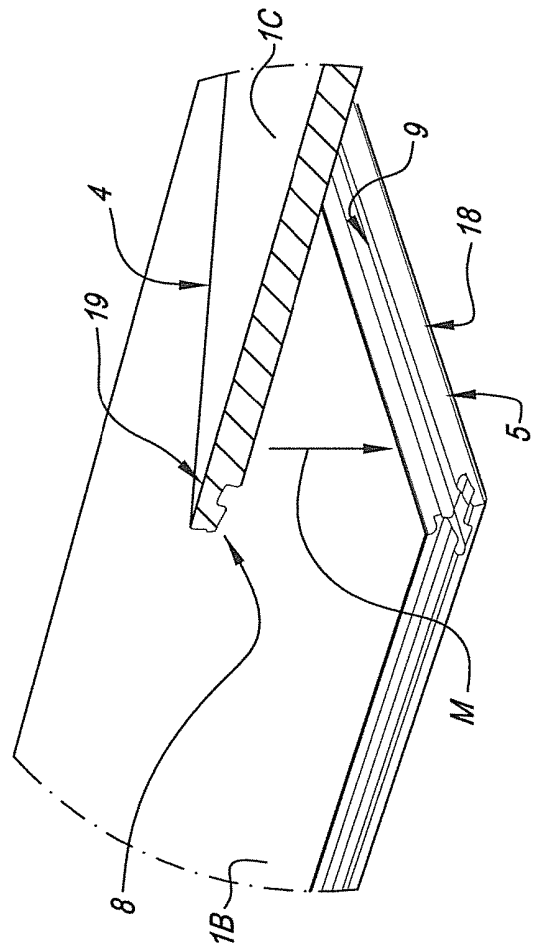


Fig. 9

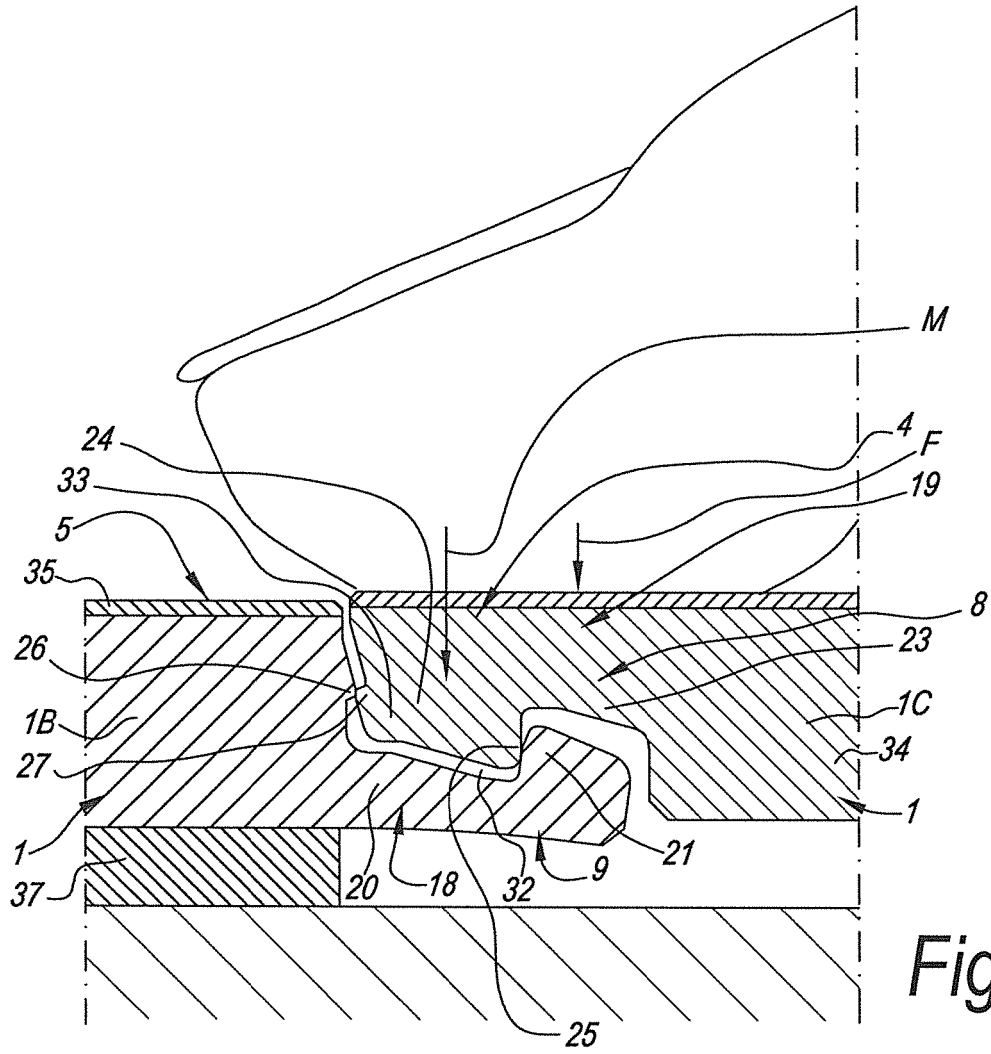


Fig. 12

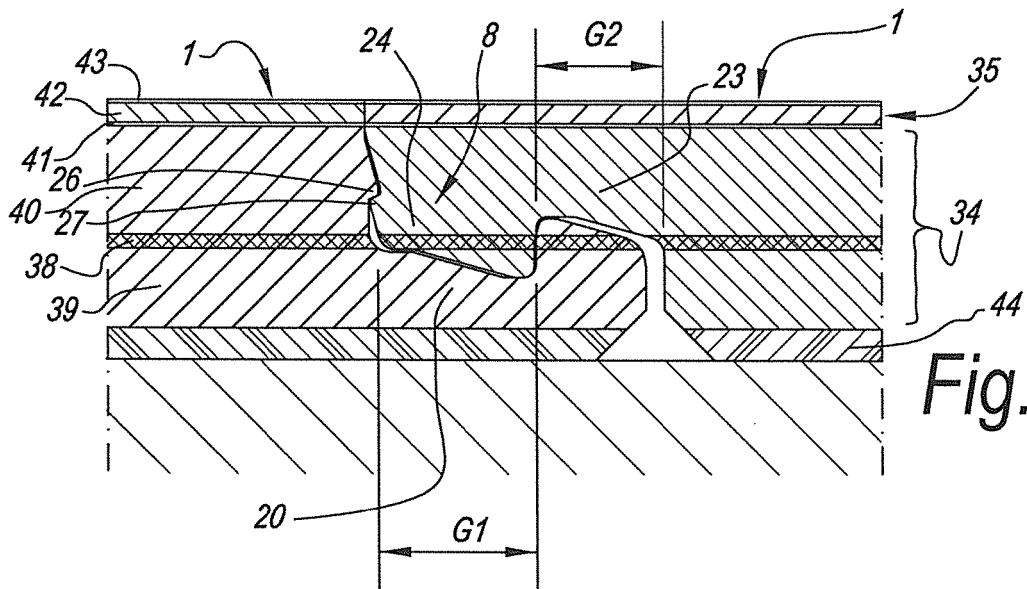


Fig. 15

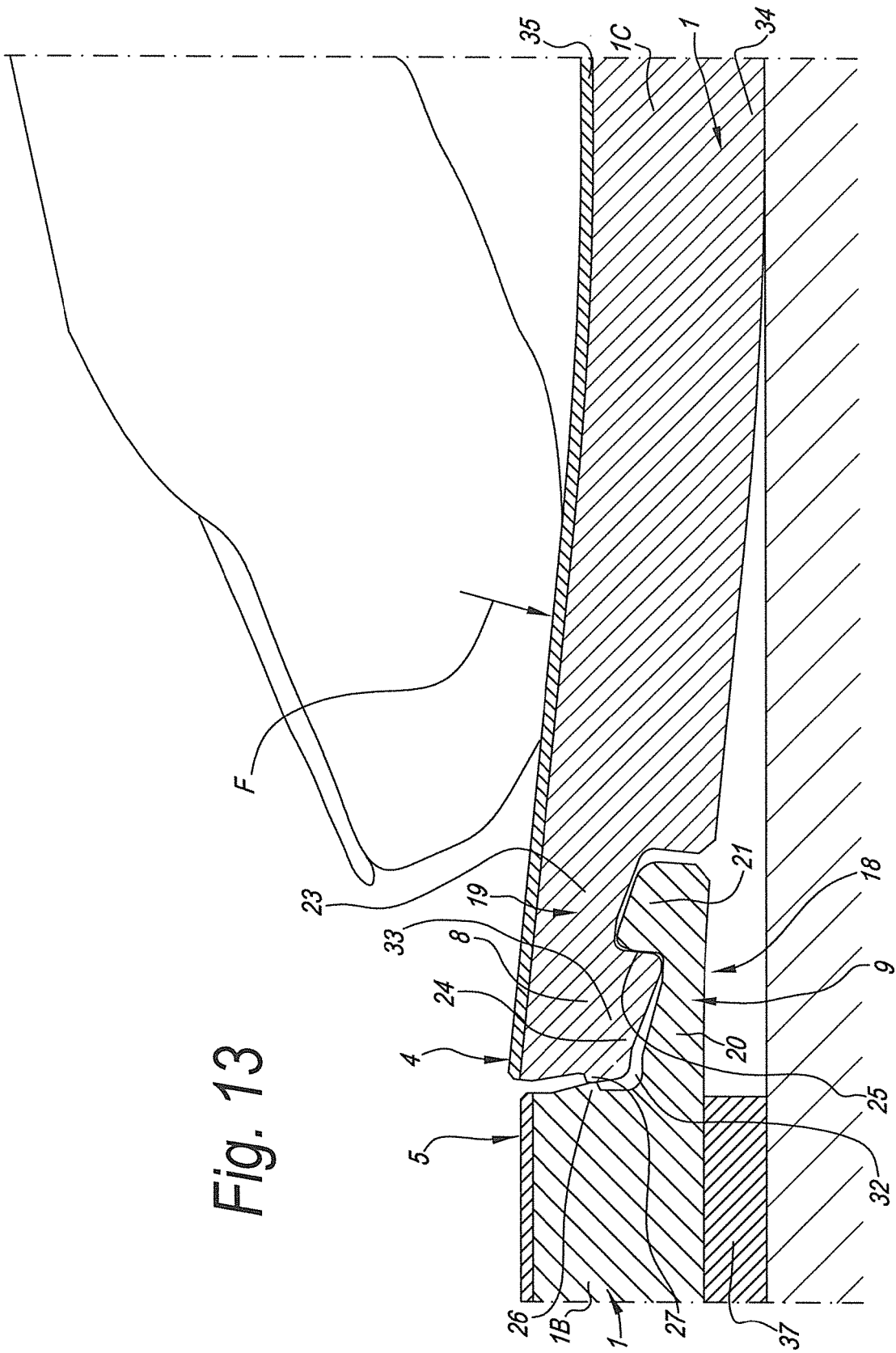


Fig. 13

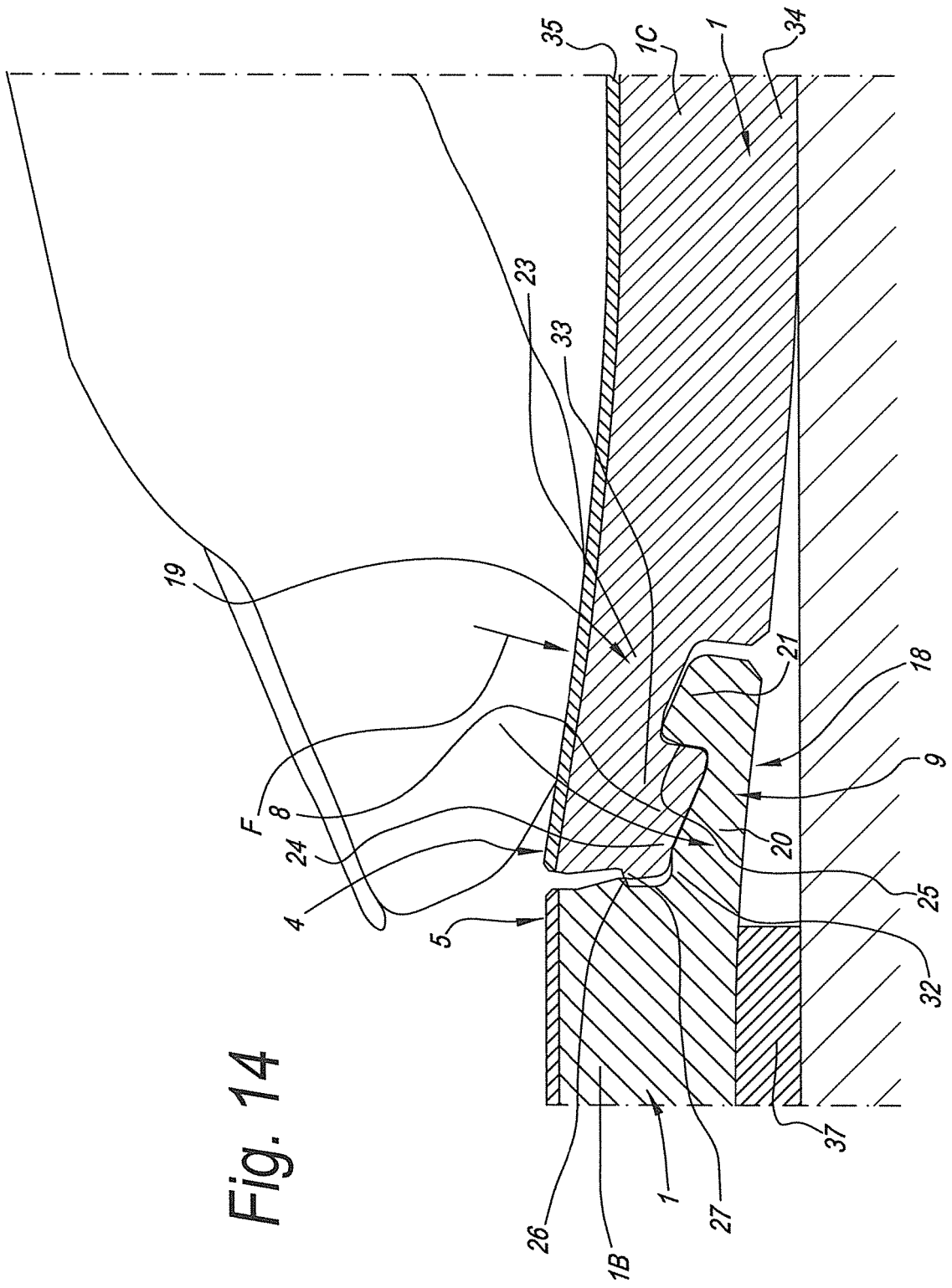


Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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